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Confirm and Success: New Tools for Insect Management in Cole Crops and Leafy Green Vegetables in Arizona

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Introduction

Confirm™ and Success™ insecticides have recently been granted Section 18 emergency use exemptions* in Arizona for use in cole crops and leafy vegetables for control of lepidopterous pests. Both of these insecticides have unique chemistries, modes of actions, and insecticidal properties that should be considered before use. Contact the Arizona Department of Agriculture for use permits and further label and application information.

Chemical Properties

Confirm

Confirm is a new insecticide developed by Rohm and Haas. It is formulated as a flowable liquid and contains 2 lbs-active ingredient per gallon of material. Confirm is an insect growth regulator classified as a diacylhydrazine, and its common name is tebufenozide. It has a unique mode of action. It acts by mimicking the insect's molting hormone, causing the insect to produce a malformed cuticle that eventually results in death. Affected larvae often exhibit darkened splotches on the cuticle. However, these symptoms are not always expressed. Because of the mode of action of Confirm, it is not active towards the adult or egg stages, it is active only towards the larvae. Confirm is considered by the E.P.A. as a reduced risk insecticide and poses minimal hazard to human health and the environment. It has a reentry interval of 4 hours, and a pre-harvest interval of 7 days. Confirm will have little impact on non-target insects and insect natural enemies.

Success

Success is a new insecticide being developed by DowElanco; it contains 2 lbs active ingredient per gallon of material. Success is derived from a fermentation by-product from an actinomyces bacteria, *Saccharopolyspora spinosa.* Chemically, Success is classified as a spinosyn and its common name is spinosad. Success has two unique modes of action. It acts primarily on the insect's nervous system at the nicotinic acetylcholine receptor, but it also exhibits activity at the GABA receptor. Poisoning causes tremors, flaccid paralysis, and relatively rapid death of the larvae. Success is not considered to have much activity towards the adult stage of lepidopterous pests. It appears to have ovo-larvicidal, where larvae are poisoned while exiting the egg. Success is considered by the E.P.A. to be a reduced risk insecticide and poses minimal hazard to human health and the environment. It has a reentry interval of 4 hours, and a pre-harvest interval 1 day. Success should have little impact on most insect natural enemies.

Insecticidal Properties

Confirm

In University of Arizona trials Confirm has demonstrated excellent efficacy against beet armyworm, and good efficacy towards cabbage looper. Cabbage loopers primarily feed on the underside of lower leaves, because of this feeding and the coverage sensitivity of Confirm, it may provide slightly less control of cabbage looper compared to beet armyworm, especially on larger plants. Confirm's activity towards beet armyworm is similar to that of Lannate (methomyl) or Larvin (thiodicarb) when tank-mixed with a pyrethroid. Against cabbage looper, Confirm appears to have activity equivalent to a pyrethroid, except coverage appears to be more critical. Confirm alone is not recommended for control of diamond-back moth or *Heliothis* larvae.

Confirm must be ingested by the larvae to confer activity. Confirm is not systemic in the plant, nor does it have notable translaminar activity, moving it into the leaf. Because of these characteristics, Confirm is a coverage sensitive material. If the product is not applied to an area of the plant where it will be

* Pending renewal, Confirm expires 26 February 1998 and Success expires 30 September 1998.

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consumed, it will not kill the insect. Efforts should be made to maximize spray coverage, especially when cabbage loopers are present. Data collected by the University of Arizona suggests that on lettuce with 10 or more leaves, aerial applications (10 gallons per acre total volume) and ground applications (30 gallons per acre total volume) exceeding 8 mph may not provide the necessary coverage to achieve adequate control.

Confirm is not a quick-acting material. In University of Arizona trials, Confirm required 3 to 5 days to induce mortality. However, larvae ceased feeding within 6 to 12 hours following ingestion of the material. Under high temperatures and high sunlight intensity conditions, Confirm can be expected to provide 3 days of good residual activity. Under cool temperatures and low sunlight intensity conditions, Confirm may provide 7 or more days of residual activity.

Confirm may be applied at 6 to 8 oz of product per acre, with an allowable total of 24 oz per acre per crop. All applications of Confirm must include the spreader-sticker, Latron CS-7 at 1 pt per acre. Avoid using any other adjuvants in combination with Confirm. Field performance of Confirm with organosilicone spreaders in Texas has been inconsistent.

Success

In University of Arizona field trials Success has demonstrated excellent efficacy against beet armyworm and cabbage looper. Others report good activity towards diamondback moth and *Heliothis.* In addition to lepidopterous larvae, Success has demonstrated efficacy towards thrips and leafminers in lettuce. Against lepidopterous pests, Success has demonstrated activity comparable to Lannate tank-mixed with a pyrethroid. Against leafminers, Success's activity is comparable to Agri-Mek, and against thrips Success is as efficacious as Lannate tank mixed with Ammo.

Although Success has some contact activity, it is most active if ingested. Success is not systemic, but does have translaminar activity, meaning it will move into the leaf tissue. The translaminar activity of Success should make it less coverage-sensitive. However, because ingestion is critical for maximum activity, adequate spray coverage is still important.

Success is a relatively fast-acting material, causing mortality in 1 to 2 days. Poisoned larvae not killed during this time period will not feed and will have stunted growth. Under high temperatures and high sunlight intensity conditions, Success can be expected to provide 3 days of good residual activity. Under cool temperatures and low sunlight intensity conditions, Success may provide 5 to 7 days of residual activity.

Success may be applied at 4 to 10 oz of product per acre, with an allowable total of 29 oz per acre per crop. Lower rates should be effective against lepidopterous pests, and should offer suppression of leafminers and thrips. If targeting leafminers or thrips, do not use less than 6 oz per acre.

Use Strategies

Confirm will have two use strategies based on the time the crop was planted and the availability of Success. For leafy vegetable and cole crops planted in late summer or fall to winter solstice (December 21st), both Confirm and Success will be available for use. Any crops planted after winter solstice will have only Confirm available for use.

Because of the slow-acting nature of Confirm, PCAs should use some degree of caution with this material. Beet armyworm and cabbage looper moths invade early-seeded fall produce almost on a nightly basis, resulting in unsynchronized egg hatches. During critical periods of extreme insect pressure, i.e. from plant emergence to thinning, slow-acting materials such as Confirm have limited utility. It may be difficult to determine which larvae have been exposed to the insecticide and which ones have not. Also, if by 5 or 7 days it is realized that spray coverage was inadequate, significant damage may have already occurred. Similarly, the University of Arizona suggests that Confirm be used cautiously following head formation. Again if by 5 to 7 days it is odvious that the spray coverage was inadequate, significant damage to harvestable portions may have already occurred. Thus slower acting materials like Confirm have their best fit in the thinning to heading window, or when populations densities are low. Therefore, under the Section 18 registration on crops planted in late summer or fall to winter solstice, Confirm will be limited for use from thinning to the beginning of head or flower formation for head lettuce, cabbage, broccoli and cauliflower. For other leafy vegetables, Confirm may be used for 30 days or the equivalent of one generation of beet armyworm, beginning at thinning. Beet armyworms will typically complete a generation in 21 to 40 days depending on the temperature. On crops planted after winter solstice, Confirm may be used at any growth stage.

Because of the slow-acting nature of Confirm, live larvae are not always a good indication of activity. PCAs should look for symptoms of poisoning, i.e. black splotches on the cuticle. Also look for fresh feeding tracks, poisoned larvae will not feed. The presence of fresh feeding tracks indicates that those larvae are probably not going to die. It may also beneficial to collect 2nd and 3rd instar larvae 1 or 2 days after treatment. Place these larvae along with a portion of the leave from which they were collected and place them in sealed plastic cup or dish. If after 5 days these larvae are not dead, re-treatment should be considered.

Under the Section 18 registration, applications of Success may be made to leafy vegetable and cole crops planted in the summer or fall until winter solstice. On these crops, Success may be used from plant emergence to thinning. After thinning Success may not be used until the beginning of head or flower formation for head lettuce, cabbage, broccoli and cauliflower, or for 30 days or one beet armyworm generation for other leafy vegetables.

Although Success is most active when ingested, its translaminar activity and rapid rate of kill make it easier to evaluate performance. Success should be used in a manner similar to current uses of tank mixes containing Lannate, Lorsban or Larvin.

Resistance Management

It is imperative that Confirm and Success, as well as older insecticides, be used in a manner to sustain long-term product efficacy. Avoid back-to-back applications of treatments containing similar active ingredients. Do not rely solely on Confirm and/or Success, make full utilization of all products available. Lannate or Larvin tank mixed with pyrethroids should still provide adequate control where high levels of resistance are not a problem. Orthene (acephate) tank mixed with endosulfan or Mustang (zeta-cypermethrin) have proven to be efficacious combinations. With time, proper use of insecticide rotations should significantly reduce the frequency of Lannate-resistant beet armyworms.

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References

Kerns, D. L. and J. C. Palumbo. 1996. Residual activity of new chemistries against beet armyworm in lettuce. N. F. Oebker [ed], *In*: College of Agriculture, 1996 Vegetable Report, pp. 147-151.

Kerns, D. L. 1996. Lannate resistance in beet armyworm in Yuma. N. F. Oebker [ed], *In*: College of Agriculture, 1996 Vegetable Report, pp. 152-153.

Palumbo, J. C. 1995. Efficacy and temporal mortality of selective insecticides on beet armyworm larvae in lettuce. N. F. Oebker [ed], *In*: College of Agriculture, 1994-1995 Vegetable Report, pp. 130-136.

Palumbo, J. C. and D. L. Kerns. 1996. Temporal activity of new insecticide chemistries against beet armyworm in lettuce. N. F. Oebker [ed], *In*: College of Agriculture, 1996 Vegetable Report, pp. 142-146.

Umeda, K. and C. Fredman. 1996. Evaluation of insecticides for lepidopterous insect control in cabbage. N. F. Oebker [ed], *In*: College of Agriculture, 1996 Vegetable Report, pp. 155-157.